

**FACT SHEET FOR NPDES PERMIT
NO. WA-005048-2**

**PUBLIC UTILITY DISTRICT #1
OF KLICKITAT COUNTY**

TOWN OF LYLE

SUMMARY

The Public Utility District #1 of Klickitat County -- Town of Lyle is seeking reissuance of its National Pollutant Discharge Elimination System (NPDES) Permit for its Publicly-Owned Treatment Works (POTW). The POTW consists of approximately four miles of sewer pipe, one lift station, and a wastewater treatment plant. The treatment plant provides secondary-level treatment utilizing an activated sludge process and chlorine disinfection, and then discharges treated wastewater through a submerged outfall to the Columbia River.

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INTRODUCTION

The Federal Clean Water Act (FCWA, 1972, and later modifications, 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has authorized the State of Washington to administer the NPDES permit program. Chapter 90.48 RCW defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The regulations adopted by the State include procedures for issuing permits (Chapter 173-220 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the State is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-220-060) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the availability of the draft permit is required at least thirty days before the permit is issued (WAC 173-220-050). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Public Utility District #1 of Klickitat County
Facility Name and Address	Town of Lyle Wastewater Treatment Facility East Landing Road Lyle, WA 98635
Type of Treatment:	Activated Sludge, Class II
Discharge Location	Columbia River, River Mile: 183.2 Latitude: 45° 41' 18" N Longitude: 121° 16' 37" W
Water Body ID Number	WA-CR-1020

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

History

The Town of Lyle Publicly-Owned Treatment Works (POTW) began operation in 1972. The facility is located on the east side of the town, across the railroad tracks on Ninth Street, between SR 14 and the Columbia River. The POTW is managed by the Public Utility District #1 of Klickitat County (District). The facility has had one major upgrade in 1992, in which one of the two existing extended aeration basins was converted to an aerobic sludge digester. In 1998, an automated, refrigerated composite influent sampler was added.

Collection System Status

The district's collection system contains 4.3 miles of sewer pipe, 8-inch and 10-inch in size. The entire system was cleaned and remote video inspected in 1986 and found to be in overall good condition with straight slopes between manholes. An analysis presented in the "Community of Lyle Wastewater Facility Plan", [August 2002, prepared by the PUD's consultant, Gray and Osborne] concluded that infiltration and inflow is not excessive in Lyle's collection system. For communities without large industries operating 24 hours/day, influent flow in the early morning hours is largely composed of infiltration. The infiltration analysis based on historical flow charts revealed that flow between 2 a.m. and 4 a.m. was only 5 gpm.

Influent flow data was compared to seven large storm events in 1998 which generated more than 0.5 inches. None of the storm events produced noticeable inflow to the collection system.

Treatment Processes

The POTW utilizes an activated sludge process within an extended aeration basin (west basin) and an aerobic digester-sludge storage basin (east basin). The aeration basin has an integral secondary clarifier. The original facility utilized the digester-sludge basin as a second aeration basin. The east basin was converted to a sludge digester due to the absence of a suitable sludge treatment facility.

Other components include a comminutor, chlorine contact basin with a V-notch weir, and sludge drying beds. The POTW is presently classified as a Class II facility based upon the Treatment Plant Classification Criteria in WAC 173-230-140.

Discharge Outfall

Secondary treated and disinfected effluent is discharged from the facility via an 8-inch pipe approximately 55 ft. from shore and under 8 ft. of water in the Columbia River at River Mile 183.2. The outfall pipe has a single port diffuser.

Residual Solids

The treatment facilities remove solids during the treatment of the wastewater at the headworks and secondary clarifier, in addition to incidental solids (rags, scum, and other debris) removed as part of the routine maintenance of the equipment. Rags, scum and coarse screenings are drained and disposed of as solid waste at a landfill. Removed biosolids are directed to sludge drying beds for drying, and afterward are stored on-site. Approximately five tons of biosolids are produced each year. As of the date this fact sheet was written, the facility had not applied for a biosolids permit for land application purposes.

Summary of Existing Facilities Issues

The Community of Lyle Wastewater Facility Plan (August 2002) presents an adequacy summary (or analysis) of the existing treatment facilities at Lyle. The facility plan was approved by the Department in September 2002. The highlights of the summary are:

- 1) The existing headworks structure does not provide influent flow measurement, fine screening, or grit removal.
- 2) The existing influent lift station has surpassed its life expectancy and will be removed from service as part of the purposed improvements project.
- 3) The existing aeration basin will not have adequate capacity to accommodate the projected flows and loadings. The existing aeration basin and aerobic digester will both be used as aerobic sludge digesters in the upgraded facility.

- 4) The existing secondary clarifier has surpassed its life expectancy. Furthermore, the single unit does not meet the Department of Ecology's reliability criteria.
- 5) The existing chlorine contact tank does not provide reliable disinfection when the effluent total residual chlorine limit contained in the facilities NPDES permit is met. Furthermore, the single unit does not meet the Department's reliability criteria.
- 6) The existing sludge drying beds should have adequate capacity to achieve the Class B pathogen requirements through the planning period.

Community of Lyle Wastewater Facility Plan – Facility Upgrades

The above referenced plan provides a long-term strategy for managing the Lyle wastewater treatment facility over a 20-year planning period. The plan details capital improvements to the facility, that are presumed to occur starting in 2004 (pending procurement of funding sources for the upgrade). A sequencing batch reactor (SBR) was chosen as the preferred wastewater treatment alternative. Other significant portions of the planned upgrade include: improved headworks equipment [fine screen, bypass screen, degritting channels, influent flow meter, influent sampler], a UV disinfection system, sludge aerobic digester improvements, and a new operations building.

PERMIT STATUS

The previous permit for this facility was issued on June 9, 1998. The previous permit placed effluent limitations on 5-day Biochemical Oxygen Demand (BOD₅), Total Suspended Solids (TSS), pH, Fecal Coliform Bacteria, and Total Residual Chlorine.

An application for permit renewal was submitted to the Department on August 1, 2002 and accepted by the Department on August 7, 2002.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility received its last inspection without sampling on February 05, 2003.

During the history of the previous permit, the Permittee has experienced problems remaining in compliance, based on Discharge Monitoring Reports (DMRs) submitted to the Department and inspections conducted by the Department.

The Department issued a Notice of Violation (NOV) [**No. DE 01WQCR-2094**] to the permittee on March 16, 2001. The NOV details the following violations of the terms of the NPDES permit effective August 1, 1998:

Condition S2.A requires that the permittee conduct monitoring under the schedule provided in the permit. Monitoring results of daily Total Residual Chlorine (TRC) concentrations were not submitted 333 times and therefore the permittee also failed to submit daily TRC loadings 333 times (calculation based on concentration). In addition, the NOV detailed the following 62 discharge limit violations:

**Table 1: Summary of Discharge Limit Violations
August 1998 Through February 2001**

Parameter / Requirement	Number of Violations
Total Residual Chlorine mg/L	35
Total Residual Chlorine lbs/day	11
BOD ₅ , mg/L, weekly average	3
BOD ₅ , mg/L, monthly average	1
TSS, mg/L average monthly	3
TSS, lbs./day, average monthly	1
TSS, mg/L average weekly	3
TSS, lbs./day, average weekly	2
TSS percent removal	2
Fecal coliforms, colonies/100ml	1
Total Discharge Violations	62

The NOV also listed violations of condition S4.A, Design Criteria which establishes waste influent loadings allowed to flow to the treatment plant. Lyle STP exceeded the plant's BOD₅ design criteria of 124 lbs. (maximum month) eight times from April 2000 through December 2000.

WASTEWATER CHARACTERIZATION

Influent -- Conventional Pollutant Loadings

Monthly influent characterization data are presented in Table 2 in comparison to design loadings. Data reflect influent loadings reported in DMRs submitted from September 2001 to December 2002.

Table 2: Characterization of Influent Loadings

Parameter	September 2001 to December 2002	Highest Monthly Loading	Percent of Monthly Design Loading	Maximum Monthly Design Loading
Flow, in MGD	0.036			0.075
BOD ₅ , in lbs/day	94	130	105	124
TSS, in lbs/day	72	108	87	142

The concentration of pollutants in the discharge was reported in the NPDES application and in discharge monitoring reports. The effluent is characterized as follows:

Table 3: Wastewater Characterization

Effluent Characterization: December 2000 to December 2002				
Parameter	Unit	Frequency	Average Value	Max/Min Value
Total flow month	MGD	Continuous	1.07	1.76 max
Average flow per day	MGD	Continuous	0.035	0.057 max
pH minimum	standard units	1/week	6.92	6.0 min
pH maximum	standard units	1/week	7.61	8.6 max
BOD ₅	mg/L	1/week	26.2	70.0 max ^a
BOD ₅	mg/L	monthly	19.4	35.0 max ^a
Removal rate BOD ₅	percent	monthly	94.4	91.0 min
BOD ₅	lbs/day	1/week	8.6	22.0 max
BOD ₅	lbs/day	month	6.0	15.0 max
TSS	mg/L	1/week	24.9	82.0 max ^a
TSS	mg/L	month	17.7	45.0 max ^a
Removal rate TSS	percent	monthly	93.4	87.0 min
TSS	lbs/day	1/week	8.2	27.0 max
TSS	lbs/day	monthly	5.5	21.0 max
TRC avg. max. daily	mg/L	daily	0.79	2.2 max
TRC	mg/L	monthly	0.34	0.5 max
TRC	lbs/day	daily	0.28 ^b	0.36 ^b
TRC	lbs/day	monthly	0.1 ^b	0.13 ^b
Fecal coliform	#colonies /100ml ^c	1/week	235	3135 max ^a
Fecal coliform	#colonies /100ml ^c	monthly	32	86 max
Dissolved Oxygen	mg/L	monthly	4.6	3.0 min

Effluent Characterization: December 2000 to December 2002				
Parameter	Unit	Frequency	Average Value	Max/Min Value
Temperature	Celsius	monthly	15.5	17.5 max
Hardness	mg/L	4/year	117.6	177.0 max
Alkalinity	mg/L	4/year	105.8	134.0 max
^a Permit violations				
^b Total Residual Chlorine loadings data from October 2001 to December 2002; TRC loading data submitted prior to October 2001 is incorrect.				
^c Geometric mean				

SEPA COMPLIANCE

A determination of non-significance (DNS) was issued January 23, 2002 for the Community of Lyle Wastewater Facility Plan. The responsible official for this DNS was Lorraine Reynolds, Water/Wastewater Manager for the Klickitat Public Utility District.

PROPOSED INTERIM AND FINAL PERMIT LIMITATIONS

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations for municipal discharges are set by regulation (40 CFR 133, and Chapters 173-220 and 173-221 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992.) The most stringent of these types of limits must be chosen for each of the parameters of concern. Each of these types of limits is described in more detail below.

The limits in this permit are based in part on information received in the application. The effluent constituents in the application were evaluated on a technology- and water quality-basis. The limits necessary to meet the rules and regulations of the State of Washington were determined and included in this permit. Ecology does not develop effluent limits for all pollutants that may be reported on the application as present in the effluent. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation. Effluent limits are not always developed for pollutants that may be in the discharge but not reported as present in the application. In those circumstances the permit does not authorize discharge of the non-reported pollutants. Effluent discharge conditions may change from the conditions reported in the permit application. If significant changes occur in any constituent, as described in 40 CFR

122.42(a), the Permittee is required to notify the Department of Ecology. The Permittee may be in violation of the permit until the permit is modified to reflect additional discharge of pollutants.

This fact sheet details both interim permit limitations for the existing treatment facility and final permit limitations for the purposed treatment plant. The details of the final permit limitations are given starting on page 14.

INTERIM DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for the existing treatment facility are taken from the previous permit. It should be noted that the facility has undergone significant process changes since these design criteria were established.

Table 4: Design Criteria for the Existing Town of Lyle STP

Parameter	Design Quantity
Monthly average flow (max. month)	0.075 MGD
BOD ₅ influent loading (max. month)	124 lbs/day
TSS influent loading (max. month)	142 lbs/day
Design population equivalent	729 persons

FINAL DESIGN CRITERIA

In accordance with WAC 173-220-150 (1)(g), flows or waste loadings shall not exceed approved design criteria.

The design criteria for the sequencing batch reactor treatment facility are taken from the Community of Lyle Wastewater Facility Plan (August 2002) prepared by Klickitat County PUD consultant, Gray and Osborne.

Table 5: SBR Design Criteria for Town of Lyle STP

Parameter	Design Influent Quantity
Average Annual Flow	0.078 MGD
Maximum Month Flow	0.098 MGD
Maximum Day Flow	0.123 MGD
Peak Hour Flow	0.234 MGD
BOD ₅ influent loading (max. month)	210 lbs/day
TSS influent loading (max. month)	200 lbs/day
Design population equivalent	980 persons

INTERIM AND FINAL TECHNOLOGY-BASED EFFLUENT LIMITATIONS

Municipal wastewater treatment plants are a category of discharger for which technology-based effluent limits have been promulgated by Federal and State regulations. These effluent limitations are given in the Code of Federal Regulations (CFR) 40 CFR Part 133 (Federal) and in Chapter 173-221 WAC (State). These regulations are performance standards that constitute all known available and reasonable methods of prevention, control, and treatment for municipal wastewater.

The following technology-based limits for pH, fecal coliform, BOD₅, and TSS are taken from Chapter 173-221 WAC are:

**Table 6: Technology-based Interim and Final Limits
for the Existing and Upgraded STP**

Parameter	Limit
pH:	shall be within the range of 6 to 9 standard units.
Fecal Coliform Bacteria	Monthly Geometric Mean = 200 organisms/100 mL Weekly Geometric Mean = 400 organisms/100 mL
BOD ₅ (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
TSS (concentration)	Average Monthly Limit is the most stringent of the following: - 30 mg/L - may not exceed fifteen percent (15%) of the average influent concentration Average Weekly Limit = 45 mg/L
Total Residual Chlorine	Average Monthly Limit = 0.5 mg/L Average Weekly Limit = 0.75 mg/L

Consideration of Interim and Final Chlorine Limits

The technology-based monthly average interim limitation for chlorine is derived from standard operating practices. The Water Pollution Control Federation's Chlorination of Wastewater (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after fifteen minutes of contact time. See also Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Third Edition, 1991. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/liter chlorine limit on a monthly average basis. According to WAC 173-221-030(11)(b), the corresponding weekly average is 0.75 mg/liter.

The existing permit has a chlorine limit of 0.5 mg/L average monthly and 0.75 mg/L daily maximum and the facility is able to comply with it. The proposed permit retains the technology based interim limit of 0.75 mg/L weekly and 0.5 mg/L monthly averages of the previous permit.

Consideration of Interim Mass Loading Limits

The following technology-based interim mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly effluent BOD and TSS mass loadings (lbs/day) were calculated as the maximum monthly design flow (0.075 MGD) x Concentration limit (30 mg/L) x 8.34 (conversion factor) = 19 lb./day.

The weekly average effluent BOD and TSS mass loading is calculated as 1.5 x monthly loading = 29 lbs/day.

These technology based interim effluent limits will not exceed water quality-based limits at the edge of the mixing zone boundary.

Consideration of Final Mass Loading Limits

The following technology-based mass limits are based on WAC 173-220-130(3)(b) and 173-221-030(11)(b).

Monthly BOD₅ and TSS effluent mass loadings (lbs/day) were calculated as the maximum month design flow (MGD) x design concentration (mg/L) x 8.34 (constant) [or 0.098 x 30 mg/L x 8.34 = 25 lbs/day].

The weekly average effluent BOD₅ and TSS mass loading is calculated as 1.5 x monthly loading [or 25 lbs/day x 1.5 = 37 lbs/day].

INTERIM AND FINAL SURFACE WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a State regulation designed to protect the beneficial uses of the surface waters of the State. Water quality-based effluent limitations may be based on an individual waste load allocation (WLA) or on a WLA developed during a basin-wide total maximum daily loading study (TMDL).

Numerical Criteria for the Protection of Aquatic Life

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

Numerical Criteria for the Protection of Human Health

The State was issued 91 numeric water quality criteria for the protection of human health by the U.S. EPA (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters.

Narrative Criteria

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh (WAC 173-201A-130) and marine (WAC 173-201A-140) waters in the State of Washington.

Antidegradation

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of

higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to Chapter 173-201A-070 WAC.

The Department has reviewed existing records and is unable to determine if ambient water quality is either higher or lower than the designated classification criteria given in Chapter 173-201A WAC; therefore, the Department will use the designated classification criteria for this water body in this permit. The discharges authorized by this permit should not cause a loss of beneficial uses.

Critical Conditions

Surface water quality-based limits are derived for the waterbody's critical condition, which represents the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or characteristic water body uses.

The critical flow is designated by a seven day period of average lowest flow with a recurrence interval of ten years (termed the river's 7Q10). The 7Q10 for the Columbia River at Lyle is 79,500 cfs. This is a statistically derived value from the USGS river gauge at the Dalles Dam from the years 1974 onward.

Interim and Final Mixing Zones and Dilution Factors

The Water Quality Standards allow the Department of Ecology to authorize mixing zones around a point of discharge in establishing surface water quality-based effluent limits. Both "acute" and "chronic" mixing zones may be authorized for pollutants that can have a toxic effect on the aquatic environment near the point of discharge. The concentration of pollutants at the boundary of these mixing zones may not exceed the numerical criteria for that type of zone. Mixing zones can only be authorized for discharges that are receiving all known, available, and reasonable methods of prevention, control and treatment (AKART) and in accordance with other mixing zone requirements of Chapter 173-201A-100 WAC. The Chapter 173-201A-100 (8)(a) WAC establishes the maximum proportion of the receiving water's flow that can be utilized for effluent dilution.

The previous permit utilized the maximum length downstream allowed by Chapter 173-201A-100 (7)(a) WAC (300 feet plus depth of diffuser). This permit will keep the same values for both the interim and final mixing zones. Chapter 173-201A-100 (7)(a) also allows the mixing zone to extend upstream from the diffuser a maximum of one hundred feet. This permit will provide for an upstream mixing zone.

Chapter 173-201A-100 WAC authorizes a maximum of 25% of the width of the river for the chronic mixing zone, a dimension which at the Columbia River near Lyle is about 560 feet wide.

Lyle's outfall discharges 55 feet from the riverbank. Therefore, the maximum width of the chronic mixing zone can be no more than 110 feet. Theoretically, mixing would not occur within five feet from the shore, due to boundary layer effects. Therefore the maximum width of the chronic mixing zone is no more than 100 feet. The permit writer used the more restrictive chronic mixing zone width output value from the Rivplum5 mixing zone model for both the interim and final mixing zones. The acute mixing zone width is also based on Rivplum5 output. These are presented in the following table:

Table 7: Interim and Final Mixing Zone Boundaries

	Distance Downstream to Point of Interest (length in feet):	Plume Width (ft)
Chronic mixing zone	308	104
Acute mixing zone	31	33

The National Toxics Rule (EPA, 1992) allows the chronic mixing zone to be used to meet human health criteria.

Interim Dilution Factors

Three methodologies were considered in determining interim dilution factors for this permit cycle. They were: 1) retaining the existing dilution factors, 2) utilizing the results of the RIVPLUME5 spreadsheet dilution model, and 3) calculating dilution factors using a volume-balance algorithm.

The dilution factors established in the previous permit, **465 (acute)** and **1490 (chronic)**, were retained in this permit in accordance with WAC 173-201A-100(6), which states that the 'size of the mixing zone shall be minimized' to the extent possible. Although the criteria used to determine these dilution factors cannot be documented, these values are the most conservative of the three methods described in the above paragraphs and do not result in a reasonable potential for pollutants in the discharge to exceed the water quality criteria. The pollutants of concern in the City's discharge are Chlorine and Temperature.

The dilution factors of effluent to receiving water that occur within these zones were modeled at the critical condition utilizing RIVPLUM5, a Department approved mixing zone model. The RIVPLUM5 spreadsheet model for this discharge is presented in Appendix C. The results of the modeling are given in Table 8:

Table 8: Interim RIVPLUM5 Dilution Factors

Parameter	Acute	Chronic
Qa (Ambient Flow)	355 cfs	3548 cfs
Qe (Effluent Flow)	0.163 cfs	0.088 cfs
Aquatic Life-based Dilution Factors	4,302	25,270

In accordance with WAC 173-201A-100(8)(a), dilution factors can also be determined utilizing the following **volume fraction equation**:

$$DF = (Q_{amb} + Q_e) \div Q_e$$

where:

Q_{amb} is the regulation-defined fraction of the 7Q10 critical season flow; and

Q_e is the regulation-defined effluent flow rate.

The Water Quality Standards restrict the portion of rivers and streams that can be mixed by effluent flows to 25% at the chronic mixing zone boundary and to 2.5% at the acute mixing zone boundary. Given the proximity of Lyle's outfall to the shoreline (55 feet), the maximum width the chronic mixing zone is only 100 feet. However, Rivplum5 outputs a chronic mixing zone width of 104 feet, utilizing the input values for river dimensions at Lyle. One hundred four feet is 4.5 % of the river width at the outfall location and 4.5 % of the maximum allowable flow for the chronic mixing zone (Q_{amb}) is 3,548 cfs. The acute mixing zone utilizes 1/10th of the flow the chronic mixing zone.

The maximum monthly effluent flow rate is 0.088 cfs and the maximum daily effluent flow rate is 0.163 cfs

Therefore, the volume fraction **chronic DF** = $(3,548 + 0.088) \div 0.088 = 40,319$
and the volume fraction **acute DF** = $(355 + 0.163) \div 0.163 = 2179$

Table 9: Interim Volumetric Fraction Dilution Factors

Parameter	Acute	Chronic
Qa (Ambient Flow)	355 cfs	3548 cfs
Qe (Effluent Flow)	0.164 cfs	0.088 cfs
Aquatic Life-based Dilution Factors	2179	40,319

Final Dilution Factors

Three methodologies were considered in determining final dilution factors for the upgraded SBR treatment plant in this permit cycle. They were: 1) retaining the existing dilution factors, 2) utilizing the results of the RIVPLUME5 spreadsheet dilution model, and 3) calculating dilution factors using a volume -balance algorithm.

The dilution factors established in the previous permit, **465 (acute)** and **1490 (chronic)**, were retained in this permit in accordance with WAC 173-201A-100(6), which states that the 'size of the mixing zone shall be minimized' to the extent possible. Although the criteria used to determine these dilution factors cannot be documented, these values are the most conservative of the two other methods described in the paragraphs below and do not result in a reasonable potential for pollutants in the discharge to exceed the water quality criteria.

The dilution factors of effluent to receiving water that occur within these zones were modeled at the critical condition utilizing RIVPLUM5, a Department approved mixing zone model. The RIVPLUM5 spreadsheet model for this discharge is presented in Appendix C. The results of the modeling are given the following table:

Table 10: Final RIVPLUM5 Dilution Factors

Parameter	Acute	Chronic
Qa (Ambient Flow)	355 cfs	3548 cfs
Qe (Effluent Flow)	0.195 cfs	0.156 cfs
Aquatic Life-based Dilution Factors	3,618	14,255

In accordance with WAC 173-201A-100(8)(a), dilution factors can also be determined utilizing the following **volume fraction equation**:

$$DF = (Q_{amb} + Q_e) \div Q_e$$

where:

Q_{amb} is the regulation-defined fraction of the 7Q10 critical season flow; and
 Q_e is the regulation-defined effluent flow rate.

The Water Quality Standards restrict the portion of rivers and streams that can be mixed by effluent flows to 25% at the chronic mixing zone boundary and to 2.5% at the acute mixing zone boundary. Given the proximity of Lyle's outfall to the shoreline (55 feet), the maximum width the chronic mixing zone is only 100 feet. However, Rivplum5 outputs a chronic mixing zone width of 104 feet, utilizing the input values for river dimensions at Lyle. One hundred four feet is 4.5 % of the river width at the outfall location and 4.5 % of the maximum allowable flow for the chronic mixing zone (Q_{amb}) is 3,548 cfs. The acute mixing zone utilizes 1/10th of the flow the chronic mixing zone..

The chronic effluent flow rate is 0.156 cfs, which is equal to the design maximum month effluent flow and the acute effluent flow rate as represented by the design maximum daily effluent flow is 0.195 cfs.

Therefore, the volume fraction **chronic DF** = $(3,548 + 0.156) \div 0.156 = 22,745$
and the volume fraction **acute DF** = $(355 + 0.195) \div 0.195 = 1,822$

Table 11: Final Volumetric Fraction Dilution Factors

Parameter	Acute	Chronic
Qa (Ambient Flow)	355 cfs	3,548 cfs
Qe (Effluent Flow)	0.195 cfs	0.156 cfs
Aquatic Life-based Dilution Factors	1,822	22,745

The dilution factors established in the previous permit, **465** (acute) and **1490** (chronic), were retained in this permit in accordance with WAC 173-201A-100(6), which states that the 'size of the mixing zone shall be minimized' to the extent possible. Although the criteria used to determine these dilution factors cannot be documented, these values are the most conservative of the three methods described in the above paragraphs and do not result in a reasonable potential for pollutants in the discharge to exceed the water quality criteria. The pollutant of concern in the City's discharge is Chlorine.

Description of the Receiving Water

The facility discharges to the Columbia River which is designated as a Class A receiving water in the vicinity of the outfall. There are no nearby documented point source outfalls. Significant nearby non-point sources of pollutants include run-off resulting from stormwater, agriculture, grazing, and forestry practices in the Klickitat River watershed. The Klickitat River discharges

to the Columbia River approximately 2/3rd mile downstream of the outfall. Characteristic uses include the following:

water supply (domestic, industrial, agricultural); stock watering; fish migration; fish rearing, spawning and harvesting; wildlife habitat; primary contact recreation; sport fishing; boating and aesthetic enjoyment; commerce and navigation.

Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

The Middle Columbia River has two ongoing Total Maximum Daily Load studies for impairments to water quality. This stretch of the river is 303(d) listed for temperature and high total dissolved gas. These studies may be finalized within the next five years, at which time wasteload allocations may be imposed.

Surface Water Quality Criteria

Applicable criteria are defined in Chapter 173-201A WAC for aquatic biota. In addition, U.S. EPA has promulgated human health criteria for toxic pollutants (EPA 1992). Criteria for this discharge are summarized below:

Table 12: Applicable Water Quality Criteria

Parameter	Criteria
Fecal Coliforms	100 organisms/100 mL maximum geometric mean
Temperature	20 degrees Celsius maximum or incremental increases above background ^a
Dissolved Oxygen	8 mg/L minimum
pH	6.5 to 8.5 standard units
Turbidity	less than 5 NTUs above background
Toxics	No toxics in toxic amounts
^a A special condition exists for the Columbia River at the outfall location. When natural conditions exceed 20 °C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed 0.3°C due to any single source or 1.1°C due to all such activities combined	

Consideration of Surface Water Quality-Based Limits for Numeric Criteria

Pollutant concentrations in the proposed discharge exceed water quality criteria at the permittee's outfall with technology-based controls which the Department has determined to be AKART. Due to the tremendous amount of dilution available at the outfall mixing zones, the Department has determined that no surface water quality standard of the State's regulations has a reasonable

potential to be exceeded by the POTW's discharge of effluent. Therefore, only technology-based effluent limitations will be placed into the purposed permit.

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near field) or at a considerable distance from the point of discharge (far field). Toxic pollutants, for example, are near-field pollutants--their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as BOD is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

The derivation of water quality-based limits also takes into account the variability of the pollutant concentrations in both the effluent and the receiving water.

Table 13: Receiving Water Data

Parameter	Value Used
Critical Flow Rate	79,500 cfs (Dalles USGS gauge #14105700)
Velocity	1.1 ft/sec
Depth	31.0 feet
Width	2,330 feet
Roughness (Manning)	n=0.033
% Slope	0.04
Temperature	20° C (critical season 10yr avg. Dalles and Bonneville Forebays) (19.5° C at Umatilla-Ecology data-critical months)
pH (high)	8.1 (USGS ref) 8.2 (Umatilla-Ecology data-critical months)
Dissolved Oxygen	9.0 (USGS ref) 9.9 (Umatilla-Ecology data-critical months)
Total Ammonia-N	0.007 (USGS ref) 0.02 (Umatilla-Ecology data-critical months)
Fecal Coliform	2.5 [100 colonies/100 ml] (Umatilla-Ecology data-critical months)
Conductivity	125 umhos/cm (Umatilla-Ecology data-critical months)
Alkalinity	70 mg/L [as CaCO ₃] (USGS ref)
Turbidity	3.2 NTU (Umatilla-Ecology data-critical months)
Hardness	60 mg/L [as CaCO ₃] (USGS ref)

BOD₅--This discharge with technology-based limitations results in a small amount of BOD loading relative to the large amount of dilution occurring in the receiving water at critical conditions. Technology-based limitations will be protective of dissolved oxygen criteria in the receiving water.

Temperature and pH--The range pH reported on the permittee's Discharge Monitoring Report's was 7.3 to 8.6. Under critical conditions there is no predicted violation of the Water Quality

Standards for Surface Waters. Therefore, the technology-based effluent limitation for pH was placed in the permit.

Due to the large dilution available, State water quality standards for temperature are not exceeded at the edge of the chronic mixing zone.

Fecal Coliform--The numbers of fecal coliform were modeled by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 1,490.

Under critical conditions there is no predicted violation of the Water Quality Standards for Surface Waters with the technology-based limit. Therefore, the technology-based effluent limitation for fecal coliform bacteria was placed in this permit.

Toxic Pollutants--Federal regulations (40 CFR 122.44) require NPDES permits to contain effluent limits for toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. This process occurs concurrently with the derivation of technology-based effluent limits. The primary toxics of concern in the Permittee's discharge are Ammonia and Chlorine. Due to the tremendous amount of dilution available in the Permittee's mixing zone, the Department has determined that no reasonable potential exists to violate surface water quality criteria at the edge of the mixing zone boundary. The previous permit did not require monitoring ammonia concentrations in the effluent. This permit requires weekly monitoring of ammonia. A reasonable potential calculation for ammonia to exceed surface water quality criteria will be conducted when the next permit is developed.

Whole Effluent Toxicity

The Water Quality Standards for Surface Waters require that the effluent not cause toxic effects in the receiving waters. Many toxic pollutants cannot be detected by commonly available detection methods. However, toxicity can be measured directly by exposing living organisms to the wastewater in laboratory tests and measuring the response of the organisms. Toxicity tests measure the aggregate toxicity of the whole effluent, and therefore this approach is called whole effluent toxicity (WET) testing.

Toxicity caused by unidentified pollutants is not expected in the effluent from this discharge as determined by the screening criteria given in Chapter 173-205 WAC. The Town of Lyle POTW has no significant industries discharging effluent to its POTW. Therefore, no whole effluent toxicity testing is required in this permit. The Department may require effluent toxicity testing in the future if it receives information that toxicity may be present in this effluent.

Human Health

Washington's water quality standards now include 91 numeric health-based criteria that must be considered in NPDES permits. These criteria were promulgated for the State by the U.S. EPA in its National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992).

The Department has determined that the applicant's discharge is unlikely to contain chemicals regulated for human health. The discharge may be re-evaluated for impacts to human health at the next permit reissuance.

Sediment Quality

The Department has promulgated aquatic sediment standards (Chapter 173-204 WAC) to protect aquatic biota and human health. These standards state that the Department may require Permittees to evaluate the potential for the discharge to cause a violation of applicable standards (WAC 173-204-400).

The Department has determined through a review of the discharger characteristics and effluent characteristics that this discharge has no reasonable potential to violate the Sediment Management Standards.

GROUND WATER QUALITY LIMITATIONS

The Department has promulgated Ground Water Quality Standards (Chapter 173-200 WAC) to protect uses of ground water. Permits issued by the Department shall be conditioned in such a manner so as not to allow violations of those standards (WAC 173-200-100).

This Permittee has no discharge to ground and therefore no limitations are required based on potential effects to ground water.

COMPARISON OF THE INTERIM AND FINAL EFFLUENT LIMITS WITH THE PREVIOUS PERMIT ISSUED JUNE 9, 1998

The new permit's interim effluent limits are compared to the effluent limits given in the previous permit Table 11. Chlorine is given as a weekly average concentration versus the daily maximum concentration in the expiring permit. The new permit contains no mass loading limits for chlorine.

**Table 14: Comparison of Interim Effluent Limits with Effluent Limits
from Previous Permit Issued in June 1998**

Parameter	Existing Permit Limits		Proposed Interim Permit Limits	
	Monthly Average	Weekly Average	Monthly Average	Weekly Average
BOD	30 mg/L 85 % removal 19 lbs/day	45 mg/L 29 lbs/day	30 mg/L 85 % removal 19 lbs/day	45 mg/L 29 lbs/day
TSS	30 mg/L 85 % removal 19 lbs/day	45 mg/L 29 lbs/day	30 mg/L 85 % removal 19 lbs/day	45 mg/L 29 lbs/day
Fecal Coliform	200/100 mL	400/100 mL	200/100 mL	400/100 mL
Ph	6 to 9 standard units		6 to 9 standard units	
Parameter	Monthly Average	Daily Maximum	Monthly Average	Weekly Average
Chlorine	0.50 mg/L	0.75 mg/L	0.50 mg/L	0.75 mg/L
Chlorine	0.3lbs/day	0.3lbs/day	N/A	N/A

**Table 15: Comparison of SBR Final Effluent Limits with Effluent Limits
from Previous Permit Issued June 1998**

Parameter	Existing Permit Limits		Proposed Final Permit Limits	
	Monthly Average	Weekly Average	Monthly Average	Weekly Average
BOD	30 mg/L 85 % removal 19 lbs/day	45 mg/L 29 lbs/day	30 mg/L 85 % removal 25 lbs/day	45 mg/L 37 lbs/day ^a
TSS	30 mg/L 85 % removal 19 lbs/day	45 mg/L 29 lbs/day	30 mg/L 85 % removal 25 lbs/day	45 mg/L 37 lbs/day
Chlorine	0.50 mg/L 0.3 lbs/day	0.75 mg/L 0.5 lbs/day	0.50 mg/L N/A	0.75 mg/L N/A
Fecal Coliform	200/100 mL	400/100 mL	200/100 mL	400/100 mL
pH	6 to 9 standard units		6 to 9 standard units	

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are required (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and the effluent limitations are being achieved.

The monitoring schedule is detailed in the proposed permit under Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring. The required monitoring frequency is consistent with agency guidance given in the current version of Ecology's *Permit Writer's Manual* (July 1994) for municipal POTW plants with discharges less than 0.1 MGD.

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*. The wastewater from this facility is analyzed at Klickitat PUD's Wishram laboratory. This facility is accredited for general chemistry and microbiology.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The provisions of Special Condition S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-220-210).

PREVENTION OF FACILITY OVERLOADING

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-220-150 require the Permittee to take the actions detailed in Special Condition S4 to plan expansions or modifications before existing capacity is reached and to report and correct conditions that could result in new or increased discharges of pollutants. Special Condition S4 restricts the amount of flow.

The permit requires the submittal of an Infiltration and Inflow study (S4.F), one year prior to the permit's expiration. Guidance on the preparation of this study is given in Appendix D of this Fact Sheet.

OPERATION AND MAINTENANCE (O&M)

This permit contains Special Condition S5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

RESIDUAL SOLIDS HANDLING

To prevent water quality problems the Permittee is required in Special Condition S7. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of sewage sludge from this facility is regulated by U.S. EPA under 40 CFR 503, and by Ecology under Chapter 70.95J RCW and Chapter 173-308 WAC. The disposal of other solid waste is under the jurisdiction of the Klickitat County Public Utilities District.

Klickitat County Public Utilities District (KCPUD) is currently out of compliance with Chapter 173-308 WAC (the state biosolids rule) with respect to biosolids produced by the Lyle POTW KCPUD. The permit requires the submittal to the Department a complete biosolids permit application packet within one year of the effective date of the permit (S7). A complete biosolids permit application packet includes: an *Application for Coverage Under the Statewide General Permit for Biosolids Management*, evidence that SEPA requirements have been met, certification that public notice requirements have been met, and any required land application plans. KCPUD should contact Daniel Thompson at (509)575-2842 to discuss the Lyle biosolids management program.

PRETREATMENT

Wastewater Permit Required

The Lyle POTW, as of the date this fact sheet was written, had no discharges from significant industrial users (SIUs). RCW 90.48 and WAC 173-216-040 require SIUs to obtain a permit prior to discharge of industrial waste to the Permittee's sewerage system. This provision prohibits the POTW from accepting industrial wastewater from any such dischargers without authorization from the Department.

Duty to Enforce Discharge Prohibitions

This provision prohibits the POTW from authorizing or permitting an industrial discharger to discharge certain types of waste into the sanitary sewer. The first portion of the provision

prohibits acceptance of pollutants which cause pass through or interference. The definitions of pass through and interference are in Appendix B of the fact sheet.

The second portion of this provision prohibits the POTW from accepting certain specific types of wastes, namely those which are explosive, flammable, excessively acidic, basic, otherwise corrosive, or obstructive to the system. In addition wastes with excessive BOD, petroleum based oils, or which result in toxic gases are prohibited to be discharged. The regulatory basis for these prohibitions is 40 CFR Part 403, with the exception of the pH provisions which are based on WAC 173-216-060.

The third portion of this provision prohibits certain types of discharges unless the POTW receives prior authorization from the Department. The discharges include cooling water in significant volumes, stormwater and other direct inflow sources, and wastewaters significantly affecting system hydraulic loading, which do not require treatment.

The Department has committed to providing technical and legal assistance to the Permittee with developing an adequate sewer use ordinance, notification procedures, enforcement guidelines, and developing local limits and inspection procedures.

Sewer Use Ordinance

The permit (S6.D) requires the submittal of a sewer use ordinance. Guidance on preparing this ordinance exists in the following publication:

Municipal Strategies for the Regulation of Sewer Use; Manual of Practice No. SM-7;
Systems Management Series; 1988; Water Pollution Control Federation

The Department has committed to providing technical and legal assistance to the Permittee in developing an adequate sewer use ordinance.

OUTFALL EVALUATION

Special Condition S.8 requires the Permittee to conduct an outfall inspection and submit a report detailing the findings of that inspection. The purpose of the inspection is to determine the condition of the discharge pipe and to determine if sediment is accumulating in the vicinity of the outfall.

GENERAL CONDITIONS

General Conditions are based directly on State and Federal law and regulations and have been standardized for all individual municipal NPDES permits issued by the Department.

PERMIT ISSUANCE PROCEDURES

PERMIT MODIFICATIONS

The Department may modify this permit to impose numerical limitations, if necessary to meet Water Quality Standards, Sediment Quality Standards, or Ground Water Standards, based on new information obtained from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

The Department may also modify this permit as a result of new or amended State or Federal regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that this permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

Environmental Protection Agency (EPA)

1992. National Toxics Rule. Federal Register, V. 57, No. 246, Tuesday, December 22, 1992.
1991. Technical Support Document for Water Quality-based Toxics Control. EPA/505/2-90-001.
1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington, D.C.
1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water. EPA/600/6-85/002a.
1983. Water Quality Standards Handbook. USEPA Office of Water, Washington, D.C.

Gray and Osborne.

2002. Community of Lyle Wastewater Facility Plan; Yakima, WA; August 2002 final revision

Metcalf and Eddy.

1991. Wastewater Engineering, Treatment, Disposal, and Reuse. Third Edition. Tsivoglou, E.C., and J.R. Wallace.
1972. Characterization of Stream Reaeration Capacity. EPA-R3-72-012. (Cited in EPA 1985 op.cit.)

Washington State Department of Ecology.

Laws and Regulations(<http://www.ecy.wa.gov/laws-rules/index.html>)

Permit and Wastewater Related Information
(<http://www.ecy.wa.gov/programs/wq/wastewater/index.html>)

Washington State Department of Ecology.

1994. Permit Writer's Manual. Publication Number 92-109

Water Pollution Control Federation.

1976. Chlorination of Wastewater.

Wright, R.M., and A.J. McDonnell.

1979. In-stream Deoxygenation Rate Prediction. Journal Environmental Engineering Division, ASCE. 105(E2). (Cited in EPA 1985 op.cit.)

APPENDIX A -- PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 25, 2002 in the Goldendale Sentinel and the White Salmon Enterprise to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on July 3, 2003 in the White Salmon Enterprise to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to: Water Quality Permit Coordinator, Department of Ecology, Central Regional Office, 15 West Yakima Avenue, Suite 200, Yakima, WA 98902.

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and the reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-220-090). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing (WAC 173-220-100).

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509/457-7105, or by writing to the address listed above.

This permit and fact sheet were written by **James Leier**.

APPENDIX B -- GLOSSARY

Acute Toxicity--The lethal effect of a pollutant on an organism that occurs within a short period of time, usually 48 to 96 hours.

AKART-- An acronym for "all known, available, and reasonable methods of prevention, control, and treatment".

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation --The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (except in the case of fecal coliform). The daily discharge is calculated as the average measurement of the pollutant over the day.

Average Weekly Discharge Limitation -- The highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The daily discharge is calculated as the average measurement of the pollutant over the day.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the Federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of a treatment facility.

BOD₅ -- The quantity of oxygen utilized by a mixed population of microorganisms acting on the nutrients in the sample in an aerobic oxidation for five days at a controlled temperature of 20 degrees Celsius, with an inhibitory agent added to prevent the oxidation of nitrogen compounds. The method for determining CBOD₅ is given in 40 CFR Part 136.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic Toxicity--The effect of a pollutant on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean Water Act (CWA)--The Federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Combined Sewer Overflow (CSO)--The event during which excess combined sewage flow caused by inflow is discharged from a combined sewer, rather than conveyed to the sewage treatment plant because either the capacity of the treatment plant or the combined sewer is exceeded.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing a minimum of four discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring --Uninterrupted, unless otherwise noted in the permit.

Critical Condition--The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Dilution Factor--A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the effluent fraction e.g., a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Engineering Report--A document which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over a short period of time as is feasible.

Industrial User-- A discharger of wastewater to the sanitary sewer which is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Infiltration and Inflow (I/I)--"Infiltration" means the addition of ground water into a sewer through joints, the sewer pipe material, cracks, and other defects. "Inflow" means the addition of precipitation-caused drainage from roof drains, yard drains, basement drains, street catch basins, etc., into a sewer.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and;

Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Major Facility--A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

Minor Facility--A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing Zone--A volume that surrounds an effluent discharge within which water quality criteria may be exceeded. The area of the authorized mixing zone is specified in a facility's permit and follows procedures outlined in State regulations (Chapter 173-201A WAC).

National Pollutant Discharge Elimination System (NPDES)--The NPDES (Section 402 of the Clean Water Act) is the Federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the State of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both State and Federal laws.

Pass through -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Potential Significant Industrial User--A potential significant industrial user is defined as an Industrial User which does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

- a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day or;
- b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

The Department may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Significant Industrial User (SIU)--

- 1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N and;
- 2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

*The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, wetlands, and all other surface waters and watercourses within the jurisdiction of the State of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Suspended Solids (TSS)--Total suspended solids are the particulate materials in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset--An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water Quality-based Effluent Limit--A limit on the concentration or mass of an effluent parameter that is intended to prevent the concentration of that parameter from exceeding its water quality criterion after it is discharged into a receiving water.

APPENDIX C -- TECHNICAL CALCULATIONS

Spread of a plume from a point source in a river with boundary effects from the shoreline based on the method of Fischer *et al.* (1979) with correction for the effective origin of effluent.

Revised 22-Feb-96

SBR Treatment Facility
Using Manning; $7Q10 = 79,500$

	ACUTE2	CHRONIC2
INPUT		
1. Effluent Discharge Rate (cfs):	0.195	0.156
2. Receiving Water Characteristics Downstream From Waste Input		
Stream Depth (ft):	31.00	31.00
Stream Velocity (fps):	1.10	1.10
Channel Width (ft):	2330.00	2330.00
Stream Slope (ft/ft) or Manning roughness "n":	0.0330	0.0330
0 if slope or 1 if Manning "n" in previous cell:	1	1
3. Discharge Distance From Nearest Shoreline (ft):	55	55
4. Location of Point of Interest to Estimate Dilution		
Distance Downstream to Point of Interest (ft):	31	308
Distance From Nearest Shoreline (ft):	55	55
5. Transverse Mixing Coefficient Constant (usually 0.5):	0.5	0.5
6. Original Fischer Method (enter 0) or <i>Effective Orig</i>	0	0
OUTPUT		
1. Source Conservative Mass Input Rate		
Concentration of Conservative Substance (%):	100.00	100.00
Source Conservative Mass Input Rate (cfs*%):	19.50	15.60
2. Shear Velocity		
Shear Velocity based on slope (ft/sec):	#N/A	#N/A
Shear Velocity based on Manning "n":		
using Prandtl equations 8-26 and 8-54 assuming hydraulic radius equals depth for wide channel		
Darcy-Weisbach friction factor "f":	0.040	0.040
Shear Velocity from Darcy-Weisbach "f" (ft/sec)	0.078	0.078
Selected Shear Velocity for next step (ft/sec):	0.078	0.078
3. Transverse Mixing Coefficient (ft ² /sec):	1.209	1.209
4. Plume Characteristics Accounting for Shoreline Effect (Fischer <i>et al.</i> , 1979)		
Co	2.45E-04	1.96E-04
x'	6.28E-06	6.24E-05
y'o	2.36E-02	2.36E-02
y' at point of interest	2.36E-02	2.36E-02
Solution using superposition equation (Fischer eqn 5.9)		
Term for n= -2	0.00E+00	0.00E+00
Term for n= -1	0.00E+00	0.00E+00
Term for n= 0	1.00E+00	1.00E+00
Term for n= 1	0.00E+00	0.00E+00
Term for n= 2	0.00E+00	0.00E+00
Upstream Distance from Outfall to <i>Effective Origin</i>	#N/A	#N/A
Effective Distance Downstream from Effluent to P	31.00	308.00
x' Adjusted for <i>Effective Origin</i>	6.28E-06	6.24E-05
C/Co (dimensionless)	1.13E+02	3.57E+01
Concentration at Point of Interest (Fischer Eqn 5.9)	2.76E-02	7.02E-03
Unbounded Plume Width at Point of Interest (ft)	33.019	104.079
Unbounded Plume half-width (ft)	16.510	52.040
Distance from near shore to discharge point (ft)	55.00	55.00
Distance from far shore to discharge point (ft)	2275.00	2275.00
Plume width bounded by shoreline (ft)	33.02	104.08
Approximate Downstream Distance to Complete Mixing	1,883,631	1,883,631
Theoretical Dilution Factor at Complete Mix:	407,451.282	509,314.103
Calculated Flux-Average Dilution Factor Across E	5774.164	22750.641
Calculated Dilution Factor at Point of Interest:	3,618	14,255

Spread of a plume from a point source in a river
with boundary effects from the shoreline based on the
method of Fischer *et al.* (1979) with correction
for the effective origin of effluent.

7Q10 = 79,500
Present POTW Using Manning

Revised 22-Feb-96

INPUT		ACUTE2	CHRONIC2
1. Effluent Discharge Rate (cfs):	0.164	0.088	
2. Receiving Water Characteristics Downstream From Waste Input			
Stream Depth (ft):	31.00	31.00	
Stream Velocity (fps):	1.10	1.10	
Channel Width (ft):	2330.00	2330.00	
Stream Slope (ft/ft) or Manning roughness "n":	0.0330	0.0330	
0 if slope or 1 if Manning "n" in previous cell:	1	1	
3. Discharge Distance From Nearest Shoreline (ft):	55	55	
4. Location of Point of Interest to Estimate Dilution			
Distance Downstream to Point of Interest (ft):	31	308	
Distance From Nearest Shoreline (ft):	55	55	
5. Transverse Mixing Coefficient Constant (usually 0.5)	0.5	0.5	
6. Original Fischer Method (enter 0) or <i>Effective Orig</i>	0	0	
OUTPUT			
1. Source Conservative Mass Input Rate			
Concentration of Conservative Substance (%):	100.00	100.00	
Source Conservative Mass Input Rate (cfs*%):	16.40	8.80	
2. Shear Velocity			
Shear Velocity based on slope (ft/sec):	#N/A	#N/A	
Shear Velocity based on Manning "n":			
using Prandtl equations 8-26 and 8-54 assuming			
hydraulic radius equals depth for wide channel			
Darcy-Weisbach friction factor "f":	0.040	0.040	
Shear Velocity from Darcy-Weisbach "f" (ft/sec)	0.078	0.078	
Selected Shear Velocity for next step (ft/sec):	0.078	0.078	
3. Transverse Mixing Coefficient (ft ² /sec):	1.209	1.209	
4. Plume Characteristics Accounting for Shoreline Effect (Fischer <i>et al.</i> , 1979)			
Co	2.06E-04	1.11E-04	
x'	6.28E-06	6.24E-05	
y'o	2.36E-02	2.36E-02	
y' at point of interest	2.36E-02	2.36E-02	
Solution using superposition equation (Fischer eqn 5.9)			
Term for n= -2	0.00E+00	0.00E+00	
Term for n= -1	0.00E+00	0.00E+00	
Term for n= 0	1.00E+00	1.00E+00	
Term for n= 1	0.00E+00	0.00E+00	
Term for n= 2	0.00E+00	0.00E+00	
Upstream Distance from Outfall to <i>Effective Origin</i>	#N/A	#N/A	
Effective Distance Downstream from Effluent to P	31.00	308.00	
x' Adjusted for <i>Effective Origin</i>	6.28E-06	6.24E-05	
C/Co (dimensionless)	1.13E+02	3.57E+01	
Concentration at Point of Interest (Fischer Eqn 5.9)	2.32E-02	3.96E-03	
Unbounded Plume Width at Point of Interest (ft)	33.019	104.079	
Unbounded Plume half-width (ft)	16.510	52.040	
Distance from near shore to discharge point (ft)	55.00	55.00	
Distance from far shore to discharge point (ft)	2275.00	2275.00	
Plume width bounded by shoreline (ft)	33.02	104.08	
Approximate Downstream Distance to Complete Mixing	1,883,631	1,883,631	
Theoretical Dilution Factor at Complete Mix:	484,469.512	902,875.000	
Calculated Flux-Average Dilution Factor Across Effluent	6865.622	40330.682	
Calculated Dilution Factor at Point of Interest:	4,302	25,270	

APPENDIX D -- INFILTRATION AND INFLOW GUIDANCE

INFILTRATION-INFLOW (I/I) REPORT GUIDELINES

Special condition S4.F. of your National Pollutant Discharge Elimination System (NPDES) permit requires the annual submission of an I/I report. This report is required in order that the municipality control I/I in their sewage system to prevent:

1. Hydraulic overloading of the treatment plant;
2. Hydraulic overloading of the collection system resulting in over-flows and/or bypasses of sewage; and
3. Dilute sewage that inhibits treatment system effectiveness or its ability to meet secondary effluent standards.

In order to comply with this requirement, the municipality shall submit, each year, a report (see attached format) which includes:

1. The average monthly flow and total rainfall for each month for the past year (for lagoons this means influent flows), together with a graph (see example) plotting a comparison of these data.
2. The average and peak design hydraulic capacity for the plant.
3. The design population equivalent for the treatment plant and the population served by the facility, per month, for the past year.
4. The I/I value for each year and the percent of average design capacity each year's I/I represents.
5. The I/I percent increase or reduction for each year subsequent to the base year I/I (year I/I reports were initiated).
6. The additional lengths of sewer lines added to the collection system, per month, for the past year.

NOTE:

The difference between the highest and lowest monthly average flow will be considered the amount of I/I the treatment facility is experiencing. After the base study, if the amount of I/I increases by 15 percent from that found in the base year based on equivalent rainfall, then the report shall additionally give an explanation for the increased I/I and what corrective measures are planned. Any questions about the report should be directed to the appropriate district engineer.

Lyle Sewage Treatment Plant Annual Infiltration/Inflow Report																
		Average Monthly Flow (MGD)			Total Monthly Rainfall (inches)			Population Served						Additional Sewer Lines Added (ft.)		
		Year			Year			Year						Year		
Month																

, 20__ to , 20__
Plant Design Capacity

Peak Design Flow:
Average Design Flow:
Population Equivalents:

Infiltration/Inflow Summary			
Year	I/I	% over Base I/I	% of Aver. Des. Flow

Comments:

APPENDIX E -- RESPONSE TO COMMENTS

Douglas Miller, Water-Waste Water Supervisor for the Klickitat Public Utility District submitted the following comments/questions to the Department regarding the Town of Lyle's NPDES Waste Discharge Permit public review draft and fact sheet:

Comment #1

The monitoring schedule of a rotational frequency, if required as written, would mean the taking of tests for BOD5, should they be taken of Monday and Tuesday, would require the out readings on a Saturday or Sunday. This places an undue burden on the Facility. The rotational could be adjusted to be only for those days that the in and out of the tests will allow for a typical day coverage by the operator (in on Wednesday, Thursday, Friday and to allow for holidays).

Department's response:

Footnote ^b, in the monitoring table (S2) of Lyle's permit will be revised so as to preclude the necessity of having to conduct BOD5 laboratory analysis on weekends and holidays. The revised footnote is as follows: ^b "1/week" means once during each calendar week. Sampling is to be conducted on a rotational basis, each successive Wednesday, Thursday, and Friday, except holidays.

Comment #2

With the dilution ratio found in the receiving waters, the extreme reporting requirements and the latitude allowable for pH range is very constrictive. This seems to be unusual for a treatment plant of this type.

Department's response:

The Department does not regard the once a week grab sampling requirement for pH to be an extreme reporting requirement. The permit places an effluent limit on pH to a 6 to 9 range. These were also the limits in the previous permit and the maximum range allowed by Chapter 173-201A WAC. Any broadening of these limits would violate the principal of the antidegradation provision in WAC 173-201A-070.

Comment #3

The temperature limitation is regulated in what manner? When the receiving stream reaches a certain level, then the limits are set in? The process used to promote clean water absorbs energy and in turn, raises the temperature of the final water. With the ratio of the discharge to the receiving stream, this is an encumbrance.

Department's response:

Effluent temperature is not limited in this permit. The Department cannot preclude the possibility of temperature effluent limits in future discharge permits.

Comment #4

When is there a requirement for the influent meter to be in place? Immediately or when the new treatment facility is completed?

Department's response:

The permit (S2) will be revised to reflect that recording of influent flow volume at the influent sampling meter, sampling point is not to take effect until completion of the new treatment plant (August 1, 2007, at the latest). Until that time, influent flow rates are to be calculated with methodologies consistent with past practices.

Comment #5

When is the ammonia requirement going into effect? What is the test to supply information for; a new regulatory in the future permits?

Department's response:

The requirement to sample ammonia in the effluent begins the week after the effective date of the permit. There is no ammonia effluent concentration or loading limit in this permit. Data collected during the course of a permit are used in determining reasonable potential for water quality standards violation and play an important part in establishing whether or not limits are required in future permits.